What is claimed is:

[c01] 1. A method for obtaining a pre-processed voxel dataset for use in a tracking algorithm for accurately tracking coronary arteries in CT images, the method comprising the steps of:

obtaining an original CT voxel dataset comprising a plurality of voxels;

creating a heart voxel dataset from the original CT voxel dataset comprising only voxels belonging to the heart;

creating a heart minus cavities voxel dataset by removing voxels belonging to the left ventricle, the right ventricle, the left atrium, the right atrium, and the aorta from the heart voxel dataset;

enhancing predetermined voxels in the heart minus cavities voxel dataset to create an enhanced heart minus cavities voxel dataset; and

mixing an intensity of the original CT voxel dataset with an intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset.

[c02] 2. The method of claim 1, wherein the pre-processed voxel dataset is utilized as input in a vessel tracking algorithm.

[c03] 3. The method claim 1, wherein enhancing predetermined voxels in the heart minus cavities voxel dataset comprises:

dilating vessels proximate the heart; and

enhancing intensities of the dilated vessels.

[c04] 4. The method of claim 3, wherein enhancing intensities of the dilated vessels comprises utilizing high pass gray-level filtering.

[c05] 5. The method of claim 1, wherein mixing the intensity of the original CT voxel dataset with the intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset comprises utilizing the simple linear combination:

$$V_{output}(i) = \alpha * V_{filtered}(i) + (1 - \alpha) * V_{original}(i)$$

wherein V_{output} *(i)* is the pre-processed voxel dataset comprising a linear mix of x-ray intensities, $V_{original}$ *(i)* is the x-ray intensity of the original CT voxel dataset, and $V_{filtered}$ *(i)* is the x-ray intensity of the enhanced heart minus cavities voxel dataset.

[c06] 6. The method of claim 5, wherein α is about 0.7.

[c07] 7. A method for obtaining a pre-processed voxel dataset for use in tracking algorithms for accurately tracking coronary arteries in CT images, the method comprising the steps of:

obtaining an original CT dataset comprising a plurality of voxels;

identifying the voxels in the original CT dataset belonging to a heart, a left ventricle, a right ventricle, a left atrium, a right atrium, and an aorta;

removing from the original CT dataset the voxels belonging to the heart to create a heart voxel dataset;

removing from the heart voxel dataset the voxels belonging to the left ventricle, the right ventricle, the left atrium, the right atrium, and the aorta to create a heart minus cavities voxel dataset;

enhancing voxels belonging to vessels proximate the heart to create an enhanced heart minus cavities voxel dataset; and

linearly mixing an x-ray intensity of the original CT dataset and an x-ray intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset.

[c08] 8. The method of claim 7, wherein the pre-processed voxel dataset is utilized as input in a vessel tracking algorithm.

[c09] 9. The method of claim 7, wherein enhancing voxels belonging to vessels proximate the heart to create the enhanced heart minus cavities voxel dataset comprises:

dilating vessels proximate the heart; and

enhancing intensities of the dilated vessels.

[c10] 10. The method of claim 9, wherein enhancing intensities of the dilated vessels comprises utilizing high pass gray-level filtering.

[c11] 11. The method of claim 7, wherein linearly mixing the x-ray intensity of the original CT dataset with the x-ray intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset comprises utilizing the simple linear combination:

$$V_{output}(i) = \alpha * V_{filtered}(i) + (1 - \alpha) * V_{original}(i)$$

wherein $V_{output}(i)$ is the pre-processed voxel dataset comprising a linear mix of x-ray intensities, $V_{original}(i)$ is the x-ray intensity of the original CT dataset, and $V_{filtered}(i)$ is the x-ray intensity of the enhanced heart minus cavities voxel dataset.

[c12] 12. The method of claim 11, wherein α is about 0.7.

[c13] 13. A system for accurately tracking coronary arteries in CT images, the system comprising:

a computed tomography apparatus capable of providing an original CT voxel dataset comprising a plurality of voxels;

a means for creating a heart voxel dataset from the original CT voxel dataset comprising only voxels belonging to the heart;

a means for creating a heart minus cavities voxel dataset by removing voxels belonging to the left ventricle, the right ventricle, the left atrium, the right atrium, and the aorta from the heart voxel dataset;

a means for enhancing predetermined voxels in the heart minus cavities voxel dataset to create an enhanced heart minus cavities voxel dataset; and

a means for mixing an intensity of the original CT voxel dataset with an intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset.

[c14] 14. The system of claim 13, wherein the pre-processed voxel dataset is utilized as input in a vessel tracking algorithm.

[c15] 15. The system claim 13, wherein the means for enhancing predetermined voxels in the heart minus cavities voxel dataset comprises:

a means for dilating vessels proximate the heart; and

a means for enhancing intensities of the dilated vessels.

[c16] 16. The system of claim 15, wherein the means for enhancing intensities of the dilated vessels comprises a means for utilizing high pass gray-level filtering.

[c17] 17. The system of claim 13, wherein the means for mixing the intensity of the original CT voxel dataset with the intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset comprises a means for utilizing the simple linear combination:

$$V_{output}(i) = \alpha * V_{filtered}(i) + (1 - \alpha) * V_{original}(i)$$

wherein $V_{output}(i)$ is the pre-processed voxel dataset comprising a linear mix of x-ray intensities, $V_{original}(i)$ is the x-ray intensity of the original CT voxel dataset, and $V_{filtered}(i)$ is the x-ray intensity of the enhanced heart minus cavities voxel dataset.

[c18] 18. The system of claim 17, wherein α is about 0.7.

[c19] 19. A system for obtaining a pre-processed voxel dataset for use in tracking algorithms for accurately tracking coronary arteries in CT images, the system comprising:

a computed tomography apparatus capable of providing an original CT dataset comprising a plurality of voxels;

a means for identifying the voxels in the original CT dataset belonging to a heart, a left ventricle, a right ventricle, a left atrium, a right atrium, and an aorta;

a means for removing from the original CT dataset the voxels belonging to the heart to create a heart voxel dataset;

a means for removing from the heart voxel dataset the voxels belonging to the left ventricle, the right ventricle, the left atrium, the right atrium, and the aorta to create a heart minus cavities voxel dataset;

a means for enhancing voxels belonging to vessels proximate the heart to create an enhanced heart minus cavities voxel dataset; and

a means for linearly mixing an x-ray intensity of the original CT dataset and an x-ray intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset.

[c20] 20. The system of claim 19, wherein the pre-processed voxel dataset is utilized as input in a vessel tracking algorithm.

[c21] 21. The system of claim 19, wherein the means for enhancing voxels belonging to vessels proximate the heart to create the enhanced heart minus cavities voxel dataset comprises:

a means for dilating vessels proximate the heart; and

a means for enhancing intensities of the dilated vessels.

[c22] 22. The system of claim 21, wherein the means for enhancing intensities of the dilated vessels comprises a means for utilizing high pass gray-level filtering.

[c23] 23. The system of claim 19, wherein the means for linearly mixing the x-ray intensity of the original CT dataset with the x-ray intensity of the enhanced heart minus cavities voxel dataset to create the pre-processed voxel dataset comprises a means for utilizing the simple linear combination:

$$V_{output}(i) = \alpha * V_{filtered}(i) + (1 - \alpha) * V_{original}(i)$$

wherein $V_{output}(i)$ is the pre-processed voxel dataset comprising a linear mix of x-ray intensities, $V_{original}(i)$ is the x-ray intensity of the original CT dataset, and $V_{filtered}(i)$ is the x-ray intensity of the enhanced heart minus cavities voxel dataset.

[c24] 24. The system of claim 23, wherein α is about 0.7.